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NATIONAL AERONAUTICS  
AND SPACE ADMINISTRATION  
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NASA-09970 (June 2004)  
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SECTION TABLE OF CONTENTS

DIVISION 09 - FINISHES

SECTION 09970

COATINGS FOR STEEL

06/04

PART 1 GENERAL

- 1.1 REFERENCES
- 1.2 SUBMITTALS
- 1.3 DELIVERY, HANDLING, AND STORAGE
- 1.4 GENERAL

PART 2 PRODUCTS

- 2.1 ABRASIVE BLASTING MATERIAL
- 2.2 SEALANT COMPOUND
- 2.3 PROTECTIVE COATINGS
  - 2.3.1 Coating Systems

PART 3 EXECUTION

- 3.1 SURFACE PREPARATION
  - 3.1.1 General
  - 3.1.2 Abrasive Blasting (AB)
  - 3.1.3 Mechanical Cleaning (MC)
- 3.2 COATING APPLICATION
  - 3.2.1 General Requirements
  - 3.2.2 Mixing and Application Procedures
  - 3.2.3 Dry-Film Thickness (DFT)
- 3.3 TOUCH-UP
- 3.4 SEALANT COMPOUND APPLICATION
- 3.5 INSPECTION
- 3.6 COATING SCHEDULE

-- End of Section Table of Contents --

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AND SPACE ADMINISTRATION Superseding NASA-09970  
(March 2003)  
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SECTION 09970

COATINGS FOR STEEL  
06/04

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NOTE: Delete, revise, or add to the text in this  
section to cover project requirements. Notes are  
for designer information and will not appear in the  
final project specification.

This section covers coating systems, materials,  
surface preparation, and application of protective  
coatings on carbon steel.

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PART 1 GENERAL

1.1 REFERENCES

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NOTE: The following references should not be  
manually edited except to add new references.  
References not used in the text will automatically  
be deleted from this section of the project  
specification.

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The publications listed below form a part of this section to the extent  
referenced:

ASTM INTERNATIONAL (ASTM)

ASTM C 920 (2002) Standard Specification for  
Elastomeric Joint Sealants

THE SOCIETY FOR PROTECTIVE COATINGS (SSPC)

SSPC A (2000) Good Painting Practice Steel  
Structures Painting Manual, Volume 1

SSPC AB-1 (2000) Mineral and Slag Abrasives

SSPC SP 1 (1982) Solvent Cleaning

SSPC SP 10 (2000) Joint Surface Preparation, Standard  
Near-White Metal Blast Cleaning (NACE No.  
2)

SSPC SP 3 (1982) Power Tool Cleaning

## 1.2 SUBMITTALS

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NOTE: Review submittal description (SD) definitions in Section 01330 SUBMITTAL PROCEDURES and edit the following list to reflect only the submittals required for the project. Submittals should be kept to the minimum required for adequate quality control. Include a columnar list of appropriate products and tests beneath each submittal description.  
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The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES in sufficient detail to show full compliance with the specification:

### SD-01 Preconstruction Submittals

Material, Equipment, and Fixture Lists shall be submitted in accordance with paragraph entitled, "General," of this section.

A Safety Plan shall be submitted in accordance with paragraph entitled, "General," of this section.

### SD-03 Product Data

Manufacturer's catalog data shall be submitted for the following items:

Abrasive Blasting Material  
Sealant Compound  
Inorganic Zinc  
Inhibitive Polyamide Epoxy  
Aliphatic Polyurethane

### SD-04 Samples

Manufacturer's Standard Color Charts shall be submitted in accordance with paragraph entitled, "General," of this section.

Inspection Forms shall be submitted in accordance with paragraph entitled, "Inspection," of this section.

### SD-05 Design Data

Mix Designs shall be submitted in accordance with paragraph entitled, "General," of this section.

Inorganic Zinc  
Inhibitive Polyamide Epoxy  
Aliphatic Polyurethane

### SD-06 Test Reports

Inspection reports shall be submitted for protective coating systems in accordance with paragraph entitled, "Inspection," of this section.

## SD-07 Certificates

Certificates shall be submitted for following items showing conformance with the referenced standards contained in this section.

Abrasive Blasting Material  
Sealant Compound  
Inorganic Zinc Coating  
Inhibitive Polyamide Epoxy  
Aliphatic Polyurethane

## SD-08 Manufacturer's Instructions

Manufacturer's instructions shall be submitted for Protective Coatings including details of thinning, mixing, handling, and application.

### 1.3 DELIVERY, HANDLING, AND STORAGE

Materials shall be delivered in their original, unopened containers bearing the manufacturer's name, shelf-life, product identification, and batch number.

Coatings, thinners, and cleaners shall be stored in tightly closed containers in a covered, well-ventilated area where they will be protected from exposure to extreme cold or heat, sparks, flame, direct sunlight, or rainfall. Manufacturer's instructions for storage limitations shall be followed.

### 1.4 GENERAL

A Safety Plan shall be submitted for protective coating systems in accordance with OSHA regulations.

Material, Equipment, and Fixture Lists shall be submitted for manufacturer's style or catalog numbers, specification and drawing reference numbers and warranty information for the Protective Coatings Systems fabrication site.

Manufacturer's Standard Color Charts shall be submitted showing manufacturer's standard finish colors.

Mix Designs shall be submitted for each type of protective coating including a complete list of ingredients and admixtures. Applicable test report shall verify that the mix has been successfully tested and meets design requirements.

## PART 2 PRODUCTS

### 2.1 ABRASIVE BLASTING MATERIAL

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**NOTE: When abrasive blasting with silica sand is performed, protective equipment required by NIOSH (National Institute for Occupational Safety and Health) must be used, to assure safety.**

**The only respirator suitable for use when using**

silica sand is Type CE, pressure-demand, abrasive blast supplied air respirator, with a protection factor of 2000.

When silica sand is not used as the blasting agent, and when a protection factor of 25 (loose fit hood/helmet) will provide adequate protection then Type CE, continuous flow, abrasive blast supplied air respirator shall be used.

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Abrasive blasting materials shall be per SSPC A, Chapter 2.4, and SSPC AB-1.

## 2.2 SEALANT COMPOUND

Sealant shall be a self-curing, single component, polysulfide-rubber type conforming to ASTM C 920. Sealant shall be gray in color and capable of being applied into the joint with a calking gun.

## 2.3 PROTECTIVE COATINGS

### 2.3.1 Coating Systems

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NOTE: Delete the inapplicable paragraph if only one coating system is used. Coating System No. 1 is defined as acceptable for normal atmospheric conditions with no top coat required. If desired, top coat may be specified. Coating System No. 2 is advantageous on and around acidic environments.

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The following two coating systems definitions are to be specified for use on the surfaces listed in the Coating Schedule, of this section, and as directed.

Coating System No. 1 shall consist of inorganic zinc only [, no top coat unless specified]. Inorganic zinc shall be selected from the following listing. Coatings, thinners, and cleaners shall be the product of one manufacturer.

Coating System No. 2 shall consist of inorganic zinc first coat, inhibitive polyamide epoxy intermediate coat, and aliphatic polyurethane finish coat. Coatings shall be selected from the following listing and all coatings, thinners, and cleaners shall be the product of the same manufacturer. Each successive coating shall be of a contrasting color to provide a visual assurance of complete coverage.

[Coating System No. 3 [\_\_\_\_\_]]

### COATING SYSTEMS

<u>INORGANIC ZINC</u>	<u>INHIBITIVE POLYAMIDE EPOXY</u>	<u>ALIPHATIC POLYURETHANE</u>	<u>MANUFACTURER</u>
Dimetcote 9	Amercoat 370	Amercoat 450HS	Ameron International 201 N. Berry Street Brea, CA 92621 714/529-1951

## COATING SYSTEMS

<u>INORGANIC ZINC</u>	<u>INHIBITIVE POLYAMIDE EPOXY</u>	<u>ALIPHATIC POLYURETHANE</u>	<u>MANUFACTURER</u>
Carbo Zinc 11	Carboguard 893	Carbothane 134HG	Carboline Company 350 Hanley Industrial Court St. Louis, MO 63144 800/848-4645 Ext. 2557
Catha-Coat 304V	Devran 201	Devthane 369	ICI-DEVOE 925 Euclid Ave. Cleveland, OH 44115 216/344-8798
347-Y-912	525-333 or 71125P	Imron 333	DuPont Company DuPont Building 1007 Market Street Wilmington, DE 19898 800/441-7515
Porter Zinc 3200	Porter Glaze 4400 High Build	Porterthane 9000 Glass Urethane	Porter Paint Company 400 South 13th Street Louisville, KY 40203 800/332-6270

### PART 3 EXECUTION

#### 3.1 SURFACE PREPARATION

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 NOTE: Specify in the coating schedule under  
 "Surface Preparation" either AB (abrasive blast) or  
 MC (mechanical cleaning). Mechanical cleaning is  
 used only when abrasive blasting is prohibited in  
 the area of work of surface preparation. SSPC A  
 should be followed.  
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##### 3.1.1 General

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 NOTE: Faying surfaces and grounding connection  
 areas shall be unpainted. Check with structural or  
 electrical engineer for possible locations of such  
 areas on the project drawings. Modify the following  
 paragraphs, as required, to identify these areas.  
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Faying surfaces that will become inaccessible after installation shall be  
 abrasive blasted and coated with inorganic zinc only, prior to installation.

Surfaces that are part of slip-critical joints shall be faying [abrasive  
 blasted] [mechanically cleaned coated with inorganic zinc] prior to  
 installation.

Surfaces to be welded shall be left uncoated. Welded areas shall then be

masked and touched up.

Prepared surfaces shall be coated within 6 hours after completion of surface preparation and before rusting or recontamination occurs. Surfaces not coated within 6 hours or which show rusting or contamination, regardless of the length of time after preparation, shall be reprepared.

Surface preparation and coating operations shall be sequenced so that freshly applied coatings will not be contaminated by dust or foreign matter.

Surfaces shall be inspected and degreased as required prior to subsequent surface preparation and the application of protective coatings. Degreasing shall be by solvent cleaning, detergent washing, or steam cleaning. SSPC SP 1 shall apply for solvent cleaning.

#### 3.1.2 Abrasive Blasting (AB)

Abrasive blasting shall conform to SSPC SP 10 and SSPC A.

Compressed air used for abrasive blasting shall be free of moisture and oil.

Surfaces not to be blasted are:

Galvanized steel and prefinished surfaces except when specified to be blast-cleaned in the coating schedule

Piston rods and bearing surfaces

A minimum nozzle pressure of 90 pounds per square inch 620 kilopascal shall be maintained.

Weld slag, weld spatter, and foreign matter shall be removed from surfaces to be coated prior to abrasive blasting using mechanical methods as specified.

Blast cleaning shall achieve a 1-to 2-mil 0.025 to 0.050 millimeter anchor profile as indicated by a surface profile comparator, replica tape, or similar device.

Rust and corrosion shall be removed from pits and depressions.

Abrasive blast aggregate shall not be reused.

All traces of abrasive residue and dust shall be removed from the surface, leaving it clean and dry.

#### 3.1.3 Mechanical Cleaning (MC)

Where mechanical cleaning is specified in the coating schedule [for existing surfaces] [and AB is prohibited], needle scalers or abrasive disks or wheels shall be used in accordance with SSPC SP 3, leaving the surface cleanliness equivalent to near-white metal (SSPC SP 10).

### 3.2 COATING APPLICATION

#### 3.2.1 General Requirements

Manufacturer's instructions for thinning, mixing, handling, and applying products shall be considered a part of this specification. In the event of

conflict between the requirements of this specification and the manufacturer's recommendations, this specification shall take precedence.

Compressed air used for spraying coatings shall be free of moisture and oil.

Each coat of material applied shall be free from runs; sags; blisters; bubbles; mud cracking; variations in color, gloss, and texture; holidays (missed areas); excessive film build; foreign contaminants; and dry overspray.

No coating shall be applied when rain is imminent or when the temperature or humidity is outside the limits recommended by the coating manufacturer.

Surface temperature shall be at least 5 degrees F 3 degrees C above the dew point.

Coatings shall be thoroughly worked into all joints, crevices, and open spaces. Special attention shall be paid to welds, cutouts, sharp edges, rivets, crevices, and bolts to ensure proper coverage and thickness.

Newly coated surfaces shall be adequately protected from damage.

Coatings shall be applied by airless or conventional spray. Airless spraying shall be used for uniform large surface areas. Conventional spraying shall be used for small areas of intricate configuration and for touchup. During application of inorganic zinc coating, maintain uniform suspension.

### 3.2.2 Mixing and Application Procedures

Material shall be stirred thoroughly using an instrument that will not induce air into coating.

Mixed material shall be strained through a 30- to 60-mesh 250- to 600-micrometer screen.

Continuous slow agitation of the material shall be provided during application of inorganic zinc coating, maintain uniform suspension. Continuous rapid agitation shall be avoided.

Material shall be thinned for workability and improved spray characteristics only.

Material shall be applied in even, parallel passes, overlapping 50 percent. Special attention shall be paid to welds, cutouts, sharp edges, rivets, crevices, and bolts to ensure proper coverage and thickness.

### 3.2.3 Dry-Film Thickness (DFT)

Coatings shall be applied to the following dry-film thicknesses:

#### Coating System No. 1:

- [a. 3 to 6 mils, 0.076 to 0.152 millimeter, inorganic zinc, as specified in Coating Schedule.]
- [b. Top coat [\_\_\_\_\_] 2 to 4 mils 0.051 to 0.102 millimeter]
- [c. Second coat, inorganic zinc, 2 to 4 mils 0.051 to 0.102 millimeter]



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- a. Inorganic primer zinc: 2.5 to 4 mils 0.060 to 0.102 millimeter
- b. Inhibitive polyamide epoxy, second coat: 2 to 4 mils 0.051 to 0.0102 millimeter
- c. Aliphatic polyurethane, third coat: 2 to 4 mils 0.051 to 0.0102 millimeter, but sufficient to hide previous coat

[Coating System No. 3: When dry through (dry to handle), the film thickness shall be checked with a calibrated nondestructive dry-film thickness gage. If less than specified thickness, additional material shall be applied as required. Proper DFT for the inorganic zinc coating shall be obtained in a single application which may consist of multiple passes, while coating is still wet.]

### 3.3 TOUCH-UP

Abrasions that occurred during shipment or erection shall be touched up as follows:

- a. Surface preparation and coating application shall conform to the manufacturer's instructions.
- b. Inorganic zinc shall be used for touch-up and repair of inorganic zinc and hot-dip galvanizing.
- c. Inhibitive polyamide epoxy and aliphatic polyurethane shall be used for touch-up and repair of coating system No. 2.

### 3.4 SEALANT COMPOUND APPLICATION

For Coating System No. 1, calking shall be accomplished after application and cure of inorganic zinc coating.

For Coating System No. 2, calking shall be accomplished after application and cure of inhibitive epoxy coat and prior to aliphatic polyurethane coat.

Exterior joints shall be calked, including, but not limited to, the following:

- a. Perimeter of faying and bearing surfaces of structural members
- b. Joints in members between intermittent welds
- c. Perimeter of bearing surfaces between floor plates and supporting members (inside, outside, top, and bottom)
- d. Stair treads, where joined to channel stringers
- e. Openings of 1/2 inch 13 millimeter or smaller (Foam filler backup shall be used as required.)
- f. Hot-dipped galvanized vent holes

### 3.5 INSPECTION

On-site work as described herein shall be inspected for compliance with

this specification by a NACE (National Association of Corrosion Engineers) Certified Coating Inspector provided by the [Contracting Officer] [Contractor].

For all protective coatings applied off-site locations, the Contractor shall provide full inspection by NACE Certified Coating Inspector. Inspector shall be present at the pre-work conference to address necessary clarification of inspection and specification requirements. Apparent deviation from the specified requirements or any out of tolerance condition shall be immediately reported to the Contracting Officer for determination of corrective action. Submit inspection reports performed by the Coating Inspector.

Inspection Forms shall be submitted at the pre-work conference which shall be used by the Coating Inspector and forwarded to the Contracting Officer prior to delivery of the coated work to the job site.

### 3.6 COATING SCHEDULE

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**NOTE: Designer shall prepare the coating schedule  
and provide the information shown below. No finish  
color is required for Coating System No. 1.**  
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<u>SURFACE</u> <u>DESCRIPTION</u>	<u>SURFACE</u> <u>PREPARATION</u>	<u>COATING</u> <u>SYSTEM</u>	<u>FINISH COLOR</u> <u>FOR COATING</u> <u>SYSTEM NO. 2</u>	<u>DRY FILM THICK-</u> <u>NESS, PRIMER</u> <u>COAT, MILS MM</u>
[_____]	[_____]	[1] [2]	[red] [green]	[3-5] [4-6] [.076-.127] [.102-.152]
	[_____]	[_____]	[_____]	

-- End of Section --